

AWARD/CONTRACT		1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 350)		RATING DO-C9(U)	PAGE OF PAGES 1 18		
2. CONTRACT (Proc. Inst. Ident.) No. N00014-02-C-0306		3. EFFECTIVE DATE SEE BLOCK 20C		4. REQUISITION/PURCHASE REQUEST/PROJECT NO. 02PR10579-00			
5. ISSUED BY OFFICE OF NAVAL RESEARCH ONR 251: BONA TILAHUN (703) 696-2591 BALLSTON TOWER ONE 800 NORTH QUINCY STREET ARLINGTON, VA 22217-5660		CODE N00014	6. ADMINISTERED BY (If other than Item 5) SCD-C DCM ATLANTA 805 WALKER STREET SUITE 1 MARIETTA, GA 30060-2789		CODE S1103A		
7. NAME AND ADDRESS OF CONTRACTOR (No., street, city, county, State and ZIP Code.) CREE INC 4600 SILICON DRIVE DURHAM, NC 27703			8. DELIVERY <input type="checkbox"/> FOB ORIGIN <input type="checkbox"/> OTHER (See below) See SECTION F of Schedule				
			9. DISCOUNT FOR PROMPT PAYMENT N.A.				
			10. SUBMIT INVOICES (4 copies unless otherwise specified) TO THE ADDRESS SHOWN IN → ITEM SEE SECTION G				
CODE 0C9J8		FACILITY CODE					
11. SHIP TO-MARK FOR PROGRAM OFFICER SEE SECTION F - DELIVERIES OR PERFORMANCE		CODE N00014	12. PAYMENT WILL BE MADE BY DFAS COLUMBUS CENTER DFAS CO SOUTH ENTITLEMENT OPERATIONS PO BOX 182264 COLUMBUS, OH 43218-2264				
13. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION: <input type="checkbox"/> 16 U.S.C. 2304(c)(N/A) <input type="checkbox"/> 41 U.S.C. 253(c)(N/A)			14. ACCOUNTING AND APPROPRIATION DATA See Attached Financial Accounting Data Sheet(s)				
15A. ITEM NO.	15B. SUPPLIES/SERVICES See SECTION B of Schedule	15C. QUANTITY	15D. UNIT	15E. UNIT PRICE	15F. AMOUNT		
15G. TOTAL AMOUNT OF CONTRACT					See SECTION B of Schedule		
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CONTRACTING OFFICER WILL COMPLETE ITEM 17 OR 18 AS APPLICABLE							
17. <input checked="" type="checkbox"/> CONTRACTOR'S NEGOTIATED AGREEMENT (Contractor is required to sign this document and return 2 copies to issuing office.) Contractor agrees to furnish and deliver all items or perform all the services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. The rights and obligations of the parties to this contract shall be subject to and governed by the following documents: (a) this award/contract, (b) the solicitation, if any, and (c) such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein. (Attachments are listed herein.)				18. <input type="checkbox"/> AWARD (Contractor is not required to sign this document.) Your offer on Solicitation Number _____, including the additions or changes made by you which additions or changes are set forth in full above, is hereby accepted as to the items listed above and on any continuation sheets. This award consummates the contract which consists of the following documents: (a) the Government's solicitation and your offer, and (b) this award/contract. No further contractual document is necessary.			
19A. NAME AND TITLE OF SIGNER (Type or print) John W. Palmour, Dir. of Advanced Devices				20A. NAME OF CONTRACTING OFFICER BONA TILAHUN Contracting Officer			
(b) (6)		19C. DATE SIGNED 26 June 02		20B. (b) (6) BY (Signature of Contracting Officer)		20C. DATE SIGNED 6/28/2002	

SECTION B - SUPPLIES OR SERVICES AND PRICES/COSTS

BASE EFFORT				
ITEM NO.	SUPPLIES/SERVICES	ESTIMATED GOVERNMENT COST SHARE	ESTIMATED CONTRACTOR COST SHARE	TOTAL ESTIMATED COSTS
0001	The Contractor shall furnish the necessary personnel and facilities to conduct the research effort as described in Section C.1 and C.2.	\$8,785,655	\$2,647,585*	\$11,433,240
	000101: AA \$5,036,261.00			
0002	Deliverables for Quarters 1-6 in accordance with Attachment Number 2			NSP
0003	Reports and Data in accordance with Exhibit A (DD Form 1423)			NSP

*Note: \$628,200 out of the estimated contractor's cost share amount of \$2,647,584 represents a 50% discount on the projected price of the SiC Wafers and SiC Epi. The SiC Wafers and SiC Epi shall be used in support of this contract and charged at the current catalog price at the time of consumption less a 50% discount. Therefore, these items are not subject to a DCAA incurred cost audit.

OPTION EFFORT				
ITEM NO.	SUPPLIES/SERVICES	ESTIMATED GOVERNMENT COST SHARE	ESTIMATED CONTRACTOR COST SHARE	TOTAL ESTIMATED COSTS
0004	The Contractor shall furnish the necessary personnel and facilities to conduct the research effort as described in Section C.1 and C.3.	\$2,914,933	\$929,839*	\$3,844,772
0005	Deliverables for Quarters 7-8 in accordance with Attachment Number 2			NSP
0006	Reports and Data in accordance with Exhibit A (DD Form 1423)			NSP

*Note: \$266,730 out of the estimated contractor's cost share amount of \$929,839 represents a 50% discount on the projected price of the SiC Wafers and SiC Epi. The SiC Wafers and SiC Epi shall be used in support of this contract and charged at the current catalog price at the time of consumption less a 50% discount. Therefore, these items are not subject to a DCAA incurred cost audit.

TOTAL ESTIMATED CONTRACT CONSIDERATION:	\$8,785,655	\$2,647,585*	\$11,433,240
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SECTION C - DESCRIPTION/SPECIFICATIONS/WORK STATEMENT

- 1) The research effort to be performed hereunder shall be subject to the requirements and standards contained in Exhibit A and the following paragraph(s).
- 2) The Contractor shall conduct the base effort research in accordance with the base effort tasks on pages 1-4 of Attachment Number 1, entitled "Statement of Work." The contractor shall provide the deliverables described under Quarters 1-6 of Attachment Number 2 of the contract.
- 3) The Contractor shall conduct the option research effort in accordance with the optional tasks described on pages 5-8 of Attachment Number 1, entitled "Statement of Work." The contractor shall provide the deliverables described under Quarters 7-8 of Attachment Number 2 of the contract.

SECTION D - PACKAGING AND MARKING

Preservation, packaging, packing and marking of all deliverable contract line items shall conform to normal commercial packing standards to assure safe delivery at destination.

SECTION E - INSPECTION AND ACCEPTANCE

Inspection and acceptance of the final delivery under this contract will be accomplished by the Program Officer designated in Section F of this contract, who shall have at least thirty (30) days after contractual delivery for acceptance.

SECTION F - DELIVERIES OR PERFORMANCE

- 1) The research effort performed under this contract shall be conducted during the period from the effective date (See Block 20C of the Standard Form 26) through eighteen (18) months thereafter. A final report will be prepared, submitted, reproduced and distributed by sixty days thereafter unless the contract is extended, in which case, the final report will be prepared in accordance with the terms of such extension.
 - a) Item No. 0002 of Section B (Deliverables) shall be delivered within the time periods stated in Attachment Number 2, F.O.B. Destination.
 - b) Item No. 0003 of Section B (Reports and Data) shall be delivered within the time periods stated in Exhibit A, F.O.B. Destination.
- 2) If the Option (CLIN 0004) is exercised, that research effort shall be conducted during the period from the date the option is exercised through six months thereafter. A final report will be prepared, submitted, reproduced and distributed by sixty days thereafter unless the contract is extended, in which case, the final report will be prepared in accordance with the terms of such extension.

- a) Item No. 0005 of Section B (Deliverables) shall be delivered within the time periods stated in Attachment Number 2, F.O.B. Destination.
 - b) Item No. 0006 of Section B (Reports and Data) shall be delivered within the time periods stated in Exhibit A, F.O.B. Destination.
- 3) Distribution, consignment and marking instructions for CLIN 0002 and if the option is exercised, CLIN 0005, shall be in accordance with the following address. In addition, the Data Sheets required under these CLINS shall also be delivered to the Program Officer stated in paragraph 4.

Tri-Service Correlation Team
Attn: Thomas Jenkins
AFRL/SNDM, Bldg 620, Area B
2241 Avionics Circle, Rm C2G69
Wright-Patterson AFB OH 45433

Ref: Contract N00014-02-C-0306

- 4) Distribution, consignment and marking instructions for CLIN 0003 and if the option is exercised, CLIN 0006, shall be in accordance with Enclosure Number 1 and the following:

Program Officer
Office of Naval Research
Ballston Tower One
800 North Quincy Street
Arlington, Virginia 22217-5660

Attn: Dr. Harry Dietrich, Code 312, Telephone (703) 696-0240
Ref: Contract N00014-02-C-0306

SECTION G - CONTRACT ADMINISTRATION DATA

1. NAPS 5252.232-9001 SUBMISSION OF INVOICES (COST REIMBURSEMENT, TIME-AND-MATERIALS, LABOR-HOUR, OR FIXED PRICE INCENTIVE) (JUL 1992)
- (a) "Invoice" as used in this clause includes contractor requests for interim payments using public vouchers (SF 1034) but does not include contractor requests for progress payments under fixed price incentive contracts.
 - (b) The Contractor shall submit invoices and any necessary supporting documentation, in an original and 4 copies, to the contract auditor at the following address:

Defense Contract Audit Agency
DCAA/MABO

P.O. Box 891
Arnold, MD 21012-0891

Telephone: (410) 260-5420
Fax: (410) 260-5986

unless delivery orders are applicable, in which case invoices will be segregated by individual order and submitted to the address specified in the order. In addition, an information copy shall be submitted to the Program Officer identified in Section F.2a of this contract. Following verification, the contract auditor* will forward the invoice to the designated payment office for payment in the amount determined to be owing, in accordance with the applicable payment (and fee) clause(s) of this contract.

- (c) Invoices requesting interim payments shall be submitted no more than once every two weeks, unless another time period is specified in the Payments clause of this contract. For indefinite delivery type contracts, interim payment invoices shall be submitted no more than once every two weeks for each delivery order. There shall be a lapse of no more than 30 calendar days between performance and submission of an interim payment invoice.
- (d) In addition to the information identified in the Prompt Payment clause herein, each invoice shall contain the following information, as applicable:

- (1) Contract line item number (CLIN)
- (2) Subline item number (SLIN)
- (3) Accounting Classification Reference Number (ACRN)
- (4) Payment terms
- (5) Procuring activity
- (6) Date supplies provided or services performed
- (7) Costs incurred and allowable under the contract
- (8) Vessel (e.g., ship, submarine or other craft) or system for which supply/service is provided.

- (e) A DD Form 250, "Material Inspection and Receiving Report",

_____ is required with each invoice submittal.
 X is required only with the final Invoice.
_____ is not required.

- (f) A Certificate of Performance

_____ shall be provided with each invoice submittal.
 X is not required

- (g) The Contractor's final invoice shall be identified as such, and shall list all other invoices (if any) previously tendered under this contract.

- (h) Costs of performance shall be segregated, accumulated and invoiced to the appropriate

ACRN categories to the extent possible. When such segregation of costs by ACRN is not possible for invoices submitted with CLINS/SLINS with more than one ACRN, an allocation ratio shall be established in the same ratio as the obligations cited in the accounting data so that costs are allocated on a proportional basis.

2. Submission of Invoices Direct to Payment Office

- a) Pursuant to DFARS 242.803(b)(1)(C), if the cognizant Government auditor has notified the contractor of its authorization to do so, the contractor may submit interim vouchers under this contract direct to the payment office shown in Block 12 of SF-26 instead of to the address shown in subparagraph (b) of section G.1 above.
- b) Such authorization does not extend to the first and final vouchers. The contractor shall continue to submit first vouchers to the cognizant auditor shown in subparagraph (b) of section G.1. above. The final voucher shall be submitted to the Administrative Contracting Officer (SF-26 block 6) with a copy to the cognizant auditor.

3. Method of Payment

As consideration for the proper performance of the work and services required under this contract, the Contractor shall be paid as follows:

- a) Costs, as provided for under the contract clause entitled "Allowable Cost and Payment," not to exceed the amount set forth as "Estimated Cost" in Section B, subject to the contract clause entitled "Limitation of Cost" or "Limitation of Funds" whichever is applicable.

4. Procuring Office Representatives

- a) In order to expedite administration of this contract, the Administrative Contracting Officer should direct inquiries to the appropriate office listed below. Please do not direct routine inquiries to the person listed in Item 20A on Standard Form 26.

Contract Negotiator – Bona Tilahun, ONR 251, (703) 696-2591, DSN 426-2591, E-Mail Address: tilahub@onr.navy.mil

Inspection and Acceptance – Dr. Harry Dietrich, ONR 312, (703) 696-0240, DSN 426-0240, E-Mail Address: dietrih@onr.navy.mil

Security Matters - Ms. Jennifer Ramsey, ONR 43, (703) 696-4618, DSN 426-4618

Patent Matters - Mr. Tom McDonnell, ONR 00CC, (703) 696-4000, DSN 426-4000.

- b) The Administrative Contracting Officer will forward invention disclosures and reports directly to Corporate Counsel (Code 00CC), Office of Naval Research, Department of the Navy, Arlington, Virginia 22217-5660. The Corporate Counsel will return the reports along with a recommendation to the Administrative Contracting Officer. The Corporate Counsel will represent the Contracting Officer with regard to invention reporting matters arising

under this contract.

5. Allotment of Funds

It is hereby understood and agreed that the Government's share of this contract will not exceed a total amount of \$8,785,655. The total amount presently available for payment and allotted to this contract is \$5,036,261. It is estimated that the amount allotted of \$5,036,261 will cover the period from the effective date of the contract (See date in Block 20C of the Standard Form 26) through ten (10) months thereafter.

6. Consent to Subcontract and/or Hire Consultants

The services of the following subcontractors have been identified as necessary for the performance of this contract:

Identified Subcontractor	Estimated Cost Base	Estimated Cost Option I
Cree Lighting Company	\$1,567,461	\$548,546
SUNY – Stony Brook	\$150,000	\$50,000

The preceding listing shall constitute the written consent of the Contracting Officer required by Paragraphs (c), (d) and (e) of the contract clause at FAR 52.244-2 entitled "Subcontracts". The Contracting Officer's written consent to subcontract is required for:

- (i) services acquired under a cost-reimbursement, time-and-materials, or labor-hour type subcontract or agreement;
- (ii) fixed price contracts that exceed the greater of \$100,000 or 5 percent of the total estimated cost of the contract;

This consent is based upon the information submitted by the prime contractor in accordance with FAR 52.244-2 (f) (1) (i) through (vii).

7. Type of Contract

This is a cost sharing (completion) contract.

SECTION H - SPECIAL CONTRACT REQUIREMENTS

1. **ONR 5252.235-9714 REPORT PREPARATION (FEB 2002)**

Scientific or technical reports prepared by the Contractor and deliverable under the terms of this contract will be prepared in accordance with format requirements contained in ANSI/NISO Z39.18-1995, Scientific and Technical Reports: Elements, Organization, and Design.

[NOTE: All NISO American National Standards are available as free, downloadable pdf(s) at <http://www.niso.org/standards/index.html> . NISO standards can also be purchased in hardcopy form from NISO Press Fulfillment, P. O. Box 451, Annapolis Junction, MD 20701-0451 USA. Telephone U.S. and Canada: (877) 736-6476; Outside the U.S. and Canada: 301-362-6904; Fax: 301-206-9789.]

2. **ONR 5252.210-9708 METRICATION REQUIREMENTS (DEC 1988)**

- a) All scientific and technical reports delivered pursuant to the terms of this contract shall identify units of measurement in accordance with the International System of Units (SI) commonly referred to as the "Metric System". Conversion to U.S. customary units may also be given where additional clarity is deemed necessary. Guidance for application of the metric system is contained in the American Society of Testing Materials document entitled "Standard Practice for Use of the International System of Units (The Modernized Metric System)" (ASTM Designation E 380-89A)
- b) This provision also applies to journal article preprints, reprints, commercially published books or chapters of books, theses or dissertations submitted in lieu of a scientific and/or technical report.

3. **Invention Disclosures and Reports**

The Contractor shall submit all invention disclosures and reports required by the Patent Rights clause of this contract to the Administrative Contracting Officer.

4. **ONR 5252.242-9718 TECHNICAL DIRECTION (FEB 2002)**

- a) Performance of the work hereunder is subject to the technical direction of the Program Officer/COR designated in this contract, or duly authorized representative. For the purposes of this clause, technical direction includes the following:
 - 1) Direction to the Contractor which shifts work emphasis between work areas or tasks, requires pursuit of certain lines of inquiry, fills in details or otherwise serves to accomplish the objectives described in the statement of work;
 - 2) Guidelines to the Contractor which assist in the interpretation of drawings, specifications or technical portions of work description.
- b) Technical direction must be within the general scope of work stated in the contract. Technical direction may not be used to:
 - 1) Assign additional work under the contract;
 - 2) Direct a change as defined in the contract clause entitled "Changes";
 - 3) Increase or decrease the estimated contract cost, the fixed fee, or the time required for contract performance; or
 - 4) Change any of the terms, conditions or specifications of the contract.
- c) The only individual authorized to in any way amend or modify any of the terms of this contract shall be the Contracting Officer. When, in the opinion of the Contractor, any

technical direction calls for effort outside the scope of the contract or inconsistent with this special provision, the Contractor shall notify the Contracting Officer in writing within ten working days after its receipt. The Contractor shall not proceed with the work affected by the technical direction until the Contractor is notified by the Contracting Officer that the technical direction is within the scope of the contract.

- d) Nothing in the foregoing paragraphs may be construed to excuse the Contractor from performing that portion of the work statement which is not affected by the disputed technical direction.

5. **ONR 5252.237-9705 Key Personnel (DEC 88)**

- a) The Contractor agrees to assign to the contract tasks those persons whose resumes were submitted with its proposal and who are necessary to fulfill the requirements of the contract as "key personnel". No substitutions may be made except in accordance with this clause.
- b) The Contractor understands that during the first ninety (90) days of the contract performance period, no personnel substitutions will be permitted unless these substitutions are unavoidable because of the incumbent's sudden illness, death or termination of employment. In any of these events, the Contractor shall promptly notify the Contracting Officer and provide the information described in paragraph (c) below. After the initial ninety (90) day period the Contractor must submit to the Contracting Officer all proposed substitutions, in writing, at least 30 days in advance (60 days if security clearance must be obtained) of any proposed substitution and provide the information required by paragraph (c) below.
- c) Any request for substitution must include a detailed explanation of the circumstances necessitating the proposed substitution, a resume for the proposed substitute, and any other information requested by the Contracting Officer. Any proposed substitute must have qualifications equal to or superior to the qualifications of the incumbent. The Contracting Officer or his/her authorized representative will evaluate such requests and promptly notify the Contractor in writing of his/her approval or disapproval thereof.
- d) In the event that any of the identified key personnel cease to perform under the contract and the substitute is disapproved, the contract may be immediately terminated in accordance with the Termination clause of the contract.

The following are identified as key personnel:

Labor Category	Name of Key Person
Program Manager	Jim Milligan
Technical Director	John Palmour
Director, Material Technology	Calvin Carter
Sr. Scientist	Adrian Powell
Manager, Crystal Growth	Don Hobgood
Manager, RF Engineering	Scott Allen

6. **Controlled Unclassified Information**

The parties understand that information and materials provided pursuant to or resulting from this contract may be export controlled, sensitive, for official use only, or otherwise protected by law, executive order or regulation. The Contractor is responsible for compliance with all applicable laws and regulations. Nothing in this Contract shall be construed to permit any disclosure in violation of those restrictions.

7. Use of Contractor Cost Share before Effective Date of Contract

Costs incurred by the contractor prior to the effective date of the contract may be recognized as contractor cost share to the extent that such costs are necessary to accomplish the objectives of the research effort. However, the contractor shall not be reimbursed with Government funds for any work performed prior to the effective date of the contract. In accordance with FAR 31.205-32, all costs (i.e. being applied towards contractor cost share) which have been incurred by the Contractor on or after 13 May 2002 and before the effective date of this contract, where their incurrence is necessary to comply with the proposed schedule, will be considered allowable only to the extent that they would have been allowable if incurred after the date of contract award and only to a maximum of \$40,000 through the date of contract award.

SECTION I - CONTRACT CLAUSES

Cost Sharing (MAY 2002) (1)

Attention: Prime Contractors. If a subaward is made to an educational institution, Prime Contractors are directed to please refer to the ONR Model Award for appropriate flow-down clauses to universities. See <http://www.onr.navy.mil>, click Contracts & Grants Icon. Click Model Awards Link. Click Section I clauses that flow-down to University subcontractors.

(A) FAR 52.252-02 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at these addresses:

<http://www.arnet.gov/far/>

http://web1.deskbook.osd.mil/htmlfiles/DBY_far.asp

http://web2.deskbook.osd.mil/htmlfiles/DBY_dfars.asp

http://farsite.hill.af.mil/farsite_script.html

For instance, a dollar threshold may trigger the applicability of the clause or a certain condition of the research may trigger the applicability of the clause. In order to provide some assistance, as to when a dollar threshold triggers a clause, we have associated certain symbols with dollar thresholds. The symbols and their appropriate dollar thresholds are as follows:

- * Applies when contract action exceeds \$10,000
- ** Applies when contract action exceeds \$100,000
- + Applies when contract action exceeds \$500,000
- ++ Applies when contract action exceeds \$500,000 and subcontracting possibilities exist. Small Business Exempt.
- x (DD 250)
- xx Not applicable

I. FEDERAL ACQUISITION REGULATION (FAR) (48 CFR CHAPTER 1) CLAUSES:

**	FAR 52.202-1	Definitions (DEC 2001)
**	FAR 52.203-3	Gratuities (APR 1984)
**	FAR 52.203-5	Covenant Against Contingent Fees (APR 1984)
**	FAR 52.203-6	Restrictions on Subcontractor Sales to the Government (JUL 1995)
**	FAR 52.203-7	Anti-Kickback Procedures (JUL 1995)
**	FAR 52.203-8	Cancellation, Rescission, and Recovery of Funds for Illegal or Improper Activity (JAN 1997)
**	FAR 52.203-10	Price or Fee Adjustment for Illegal or Improper Activity (JAN 1997)
**	FAR 52.203-12	Limitation on Payments to Influence Certain Federal Transactions (JUN 1997)
**	FAR 52.204-4	Printing/Copying Double-Sided on Recycled Paper (AUG 2000)
	FAR 52.211-15	Defense Priority and Allocation Requirements (SEP 1990)

**	FAR 52.215-2	Audit and Records - Negotiation (JUN 1999) and Alternate II (APR 1998) (Alternate II is only applicable with cost reimbursement contracts with State and local Governments, educational institutions, and other non-profit organizations.)
	FAR 52.215-8	Order of Precedence - Uniform Contract Format (OCT 1997)
+	FAR 52.215-10	Price Reduction for the Defective Cost or Pricing Data (OCT 1997) (The clause is applicable to subcontracts over \$550,000.)
+	FAR 52.215-12	Subcontractor Cost or Pricing Data (OCT 1997) (Applicable to subcontracts over \$550,000 only)
**	FAR 52.215-14	Integrity of Unit Prices (OCT 1997) and Alternate I (OCT 1997) (Alternate I is applicable if the action is contracted under Other Than Full and Open Competition)
+	FAR 52.215-15	Pension Adjustments and Asset Reversions (DEC 1998)
+	FAR 52.215-18	Reversion or Adjustment of Plans for Postretirement Benefits (PRB) Other than Pensions (OCT 1997)
+	FAR 52.215-19	Notification of Ownership Changes (OCT 1997) (Applicable when Cost or Pricing Data is required)
	FAR 52.216-7	Allowable Cost and Payment (FEB 2002)
	FAR 52.216-8	Fixed Fee (MAR 1997)
**	FAR 52.219-4	Notice of Price Evaluation Preference for HUBzone Small Business Concerns (JAN 1999)
**	FAR 52.219-8	Utilization of Small Business Concerns (OCT 2000)
++	FAR 52.219-9	Small Business Subcontracting Plan (JAN 2002)
++	FAR 52.219-16	Liquidated Damages - Subcontracting Plan (JAN 1999)
	FAR 52.222-1	Notice to the Government of Labor Disputes (FEB 1997)
**	FAR 52.222-2	Payment for Overtime Premiums (JUL 1990) (Note: The word "zero" is inserted in the blank space indicated by an asterisk)
	FAR 52.222-3	Convict Labor (AUG 1996) (Reserved when FAR 52.222-20 Walsh Healy Public Contracts Act is applicable)
**	FAR 52.222-4	Contract Work Hours and Safety Standards Act - Overtime Compensation (SEP 2000)
	FAR 52.222-21	Prohibition of Segregated Facilities (FEB 1999)
	FAR 52.222-26	Equal Opportunity (APR 2002)
*	FAR 52.222-35	Equal Opportunity for Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans (DEC 2001 1998)
*	FAR 52.222-36	Affirmative Action for Workers with Disabilities (JUN 1998)
*	FAR 52.222-37	Employment Reports on Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans (DEC 2001)
**	FAR 52.223-14	Toxic Chemical Release Reporting (OCT 2000)
	FAR 52.225-13	Restrictions on Certain Foreign Purchases (JUL 2000)
**	FAR 52.227-1	Authorization and Consent (JUL 1995) and Alternate I (APR 1984)
**	FAR 52.227-2	Notice and Assistance Regarding Patent and Copyright Infringement (AUG 1996)
	FAR 52.228-7	Insurance Liability to Third Persons (MAR 1996) (Further to paragraph (a)(3), unless otherwise stated in this contract, types and limits of insurance required are as stated in FAR 28.307-2)
	FAR 52.232-9	Limitation on Withholding of Payments (APR 1984)
**	FAR 52.232-17	Interest (JUN 1996)
	FAR 52.232-23	Assignment of Claims (JAN 1986) and Alternate I (APR 1984)

	FAR 52.232-25	Prompt Payment (FEB 2002) and Alternate I (FEB 2002) (The words "the 30 th day" are inserted in lieu of "the 7 th day" at (a)(5)(i). [When Alternate I is applicable (a)(5)(i) does not apply] [Alternate I applies when awarding a cost reimbursement contract for services]
	FAR 52.232-33	Payment by Electronic Funds Transfer - Central Contractor Registration (MAY 1999)
	FAR 52.233-1	Disputes (DEC 1998)
	FAR 52.233-3	Protest After Award (AUG 1996) and Alternate I (JUN 1985)
	FAR 52.242-1	Notice of Intent to Disallow Costs (APR 1984)
+	FAR 52.242-3	Penalties for Unallowable Costs (MAY 2001)
	FAR 52.242-4	Certification of Final Indirect Costs (JAN 1997)
**	FAR 52.242-13	Bankruptcy (JUL 1995)
	FAR 52.242-15	Stop Work Order (AUG 1989) and Alternate I (APR 1984)
	FAR 52.244-2	Subcontracts (AUG 1998) and Alternate I (AUG 1998) [Insert in cost-reimbursement contracts, and letter, time-and-material, and labor-hour contracts exceeding SAP, and fixed price contracts exceeding SAP where unpriced actions are anticipated. Use Alternate I for cost-rembursement contracts]
**	FAR 52.244-5	Competition in Subcontracting (DEC 1996)
	FAR 52.244-6	Subcontracts for Commercial Items and Commercial Components (APR 2002)
	FAR 52.245-5	Government Property (Cost-Reimbursement, Time-and-Materials, or Labor-Hour Contracts) (JAN 1986) and ALT I (JUL 1985) (As modified by DoD Class Deviation 99-00008 dated 13 July 1999) (ALT I is applicable if the contractor is a nonprofit organization whose primary purpose is the conduct of scientific research)
**	FAR 52.247-64	Preference for Privately Owned U.S. Flag Commercial Vessels (JUN 2000)
	FAR 52.249-6	Termination (Cost-Reimbursement) (SEP 1996)
	FAR 52.249-14	Excusable Delays (APR 1984)
	FAR 52.251-1	Government Supply Sources (APR 1984)
	FAR 52.253-1	Computer Generated Forms (JAN 1991)

II. DEPARTMENT OF DEFENSE FAR SUPPLEMENTAL (DFARS) (48 CFR CHAPTER 2) CLAUSES:

**	DFARS 252.203-7001	Prohibition On Persons Convicted of Fraud or Other Defense-Contract-Related Felonies (MAR 1999)
	DFARS 252.204-7003	Control of Government Work Product (APR 1992)
	DFARS 252.204-7004	Required Central Contractor Registration (NOV 2001)
**	DFARS 252.209-7000	Acquisition from Subcontractors subject to On-Site Inspection under the Intermediate Range Nuclear Forces (INF) Treaty (NOV 1995)
**	DFARS 252.209-7004	Subcontracting with Firms That Are Owned or Controlled by the Government of a Terrorist Country (MAR 1998)
+	DFARS 252.215-7000	Pricing Adjustments (DEC 1991)
++	DFARS 252.219-7003	Small, Small Disadvantaged and Women-owned Small Business Subcontracting Plan (DoD Contracts) (APR 1996)
**	DFARS 252.225-7012	Preference for Certain Domestic Commodities (APRIL 2002)
	DFARS 252.225-7031	Secondary Arab Boycott of Israel (JUN 1992)
	DFARS 252.227-7013	Rights in Technical Data – Noncommercial Items (NOV 1995), and Alternate I (JUN 1995)
	DFARS 252.227-7014	Rights In Noncommercial Computer Software and Noncommercial

		Computer Software Documentation (JUN 1995)
	DFARS 252.227-7016	Rights in Bid or Proposal Information (JUN 1995)
	DFARS 252.227-7019	Validation of Asserted Restrictions – Computer Software (JUN 1995)
	DFARS 252.227-7025	Limitations on the Use or Disclosure of Government-Furnished Information Marked with Restrictive Legends (JUN 1995)
	DFARS 252.227-7028	Technical Data or Computer Software Previously Delivered to the Government (JUN 1995)
	DFARS 252.227-7030	Technical Data – Withholding of Payment (MAR 2000)
	DFARS 252.227-7036	Declaration of Technical Data Conformity (JAN 1997)
	DFARS 252.227-7037	Validation of Restrictive Markings on Technical Data (SEP 1999)
	DFARS 252.231-7000	Supplemental Cost Principles (DEC 1991)
	DFARS 252.242-7000	Post-Award Conference (DEC 1991)
**	DFARS 252.243-7002	Requests for Equitable Adjustment (MAR 1998)
	DFARS 252.245-7001	Reports of Government Property (MAY 1994)
X	DFARS 252.246-7000	Material Inspection and Receiving Report (DEC 1991)
	DFARS 252.251-7000	Ordering from Government Supply Sources (MAY 1995)
**	DFARS 252.247-7023	Transportation of Supplies by Sea (MAR 2000)
**	DFARS 252.247-7024	Notification Of Transportation Of Supplies By Sea (MAR 2000) (Applicable when the Contractor has made a negative response to the inquiry in the representation at DFARS 252.247-7022.)
	DFARS 252.251-7000	Ordering from Government Supply Sources (MAY 1995)

(B) ADDITIONAL FAR AND DFARS CLAUSES

This contract incorporates one or more clauses by reference as indicated by the mark of (X), with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this address: <http://www.arnet.gov/far/>

	FAR 52.204-2	Security Requirements (AUG 1996) (Applicable if contract will generate or require access to classified information and DD Form 254, Contract Security Classification Specification, is issued to the contractor)
X	FAR 52.209-6	Protecting the Government's Interest when Subcontracting with Contractors Debarred, Suspended, or Proposed for Debarment (JUL 1995) (Applicable to contracts exceeding \$25,000 in value.)
	FAR 52.215-17	Waiver of Facilities Capital Cost of Money (OCT 1997) (Applicable if the Contractor did not propose facilities capital cost of money in the offer)
X	FAR 52.215-20	Requirements for Cost or Pricing Data or Information Other Than Cost or Pricing Data (OCT 1997) (Applicable if cost or pricing data or information other than cost or pricing data are required)
X	FAR 52.215-21	Requirements for Cost or Pricing Data or Information Other Than Cost or Pricing Data - Modifications (OCT 1997) (Applicable if cost or pricing data or information other than cost or pricing data will be required for modifications)
X	FAR 52.217-9	Option to Extend the Term of the Contract (MAR 2000) (In paragraph (a), insert "the period of performance", and in paragraph (c), insert "24 months") (Applicable if contract contains line item(s) for option(s)) (Complete the spaces in parentheses)
	FAR 52.219-3	Notice of Total HUBZone Set-Aside (JAN 1999)

	FAR 52.219-5	Very Small Business Set-Aside (MAR 1999) (For actions between \$2,500 and \$50,000)
	FAR 52.219-6	Notice of Total Small Business Set-Aside (JUL 1996), and Alternate I (OCT 1995) (Applicable to total small business set-asides, including SBIR)
	FAR 52.219-7	Notice of Partial Small Business Set-Aside (JUL 1996) and Alternate I (OCT 1995)
	FAR 52.219-10	Incentive Subcontracting Program (OCT 2001) (Applicable at the PCO's discretion to contract actions exceeding \$500,000 and when subcontracting possibilities exist. The clause is small business exempt) (In paragraph (b), insert the appropriate number between 0 and 10 – "XX") (Complete the space in the parentheses)
	FAR 52.219-25	Small Disadvantaged Business Participation Program - Disadvantaged Status and Reporting (OCT 1999) (Applicable if contract includes FAR 52.219-24)
	FAR 52.219-26	Small Disadvantaged Business Participation Program - Incentive Subcontracting Program (OCT 2000) (Applicable at the PCO's discretion to contract actions exceeding \$500,000 and when subcontracting possibilities exist. The clause is small business exempt) (In paragraph (b), insert the appropriate number between 0 and 10 – "XX") (Complete the space in the parentheses)
X	FAR 52.222-20	Walsh Healy Public Contracts Act (DEC 1996) (Applicable if the contract includes deliverable materials, supplies, articles or equipment in an amount that exceeds or may exceed \$10,000)
	FAR 52.223-5	Pollution Prevention and Right-to-Know Information (APR 1998) (Applicable if contract provides for performance, in whole or in part, on a Federal facility)
X	FAR 52.223-6	Drug-Free Workplace (MAY 2001) (Applies when contract action exceeds \$100,000 or at any value when the contract is awarded to an individual)
	FAR 52.230-2	Cost Accounting Standards (APR 1998) (Applicable when contract amount is over \$500,000, if contractor is subject to full CAS coverage, as set forth in 48 CFR Chapter 99, Subpart 9903.201-2(a) (FAR Appendix B)
X	FAR 52.230-3	Disclosure and Consistency of Cost Accounting Practices (APR 1998) (Applicable when contract amount is over \$500,000 but less than \$25 million, and the offeror certifies it is eligible for and elects to use modified CAS coverage as set forth in 48 CFR Chapter 99, Subpart 9903.201-2 (FAR Appendix B)
X	FAR 52.230-6	Administration of Cost Accounting Standards (NOV 1999) (Applicable if contract is subject to either clause at FAR 52.230-2, FAR 52.230-3 or FAR 52.230-5)
X	FAR 52.232-20	Limitation of Cost (APR 1984) (Applicable only when contract action is fully funded)
X	FAR 52.232-22	Limitation of Funds (APR 1984) (Applicable only when contract action is incrementally funded)
	FAR 52.239-1	Privacy or Security Safeguards (AUG 1996) (Applicable to contracts for information technology which require security of information technology, and/or are for the design, development, or operation of a system of records using commercial information technology services or support services.)
	FAR 52.245-18	Special Test Equipment (FEB 1993) Applicable when it is anticipated

		that the contractor will acquire or fabricate special test equipment but the exact identification of the equipment is not known)
X	DFARS 252.203-7002	Display of DoD Hotline Poster (DEC 1991) (Applicable only when contract action exceeds \$5 million or when any modification increases contract amount to more than \$5 million)
X	DFARS 252.204-7000	Disclosure of Information (DEC 1991) (Applies when Contractor will have access to or generate unclassified information that may be sensitive and inappropriate for release to the public)
	DFARS 252.204-7005	Oral Attestation of Security Responsibilities (NOV 2001) (Applicable if FAR 52.204-2, Security Requirements Applies)
X	DFARS 252.205-7000	Provision of Information to Cooperative Agreement Holders (DEC 1991) (Applicable only when contract action exceeds \$500,000 or when any modification increases total contract amount to more than \$500,000)
X	DFARS 252.215-7002	Cost Estimating System requirements (Oct 1998) (Applicable only to contract actions awarded on the basis of certified cost or pricing data)
	DFARS 252.223-7004	Drug-Free Work Force (SEP 1988) (Applicable (a) if contract involves access to classified information: or (b) when the Contracting Officer determines that the clause is necessary for reasons of national security or for the purpose of protecting the health or safety of performance of the contract.
	DFARS 252.223-7006	Prohibition on Storage and Disposal of Toxic and Hazardous Materials (APR 1993) (Applicable if work requires, may require, or permits contractor performance on a DoD installation)
	DFARS 252.225-7001	Buy American Act and Balance of Payments Program (MAR 1998) (Applicable if the contract includes deliverable supplies) (This clause does not apply if an exception to the Buy American Act or Balance of Payments Program is known or if using the clause at 252.225-7007, 252.225-7021, or 252.225-7036.)
	DFARS 252.225-7002	Qualifying Country Sources as Subcontractors (DEC 1991) (Applicable when clause at DFARS 252.225-7001, 252.227-7007, 252.227-7021, or 252.227-7036 applies)
	DFARS 252.225-7007	Buy American Act – Trade Agreements – Balance of Payments Program (SEP 2001) (Use instead of FAR 52.225-5, Trade Agreements (Include in contracts valued at \$186,000 or more, if the Trade Agreements Act applies (see 25.401 and 25.403) and the agency has determined that the restrictions of the Buy American Act or Balance of Payments Program are not applicable to U.S.– made end products, unless the acquisition is to be awarded and performed outside the United States in support of a contingency operation or a humanitarian or peacekeeping operation and does not exceed the increase simplified acquisition threshold of \$200,000.) The clause need not be used where purchase from foreign sources is restricted (see 225.401 (b)(ii)). The clause may be used where the contracting officer anticipates a waiver of the restriction.)
	DFARS 252.225-7008	Supplies to be Accorded Duty-Free Entry (MAR 1998) (Applicable when the contract provides for duty-free entry and includes FAR 52.225-8 – Duty-Free Entry)
	DFARS 252.225-7009	Duty-Free Entry – Qualifying Country Supplies (End Products and Components) (AUG 2000) (Applicable if contract includes deliverable supplies)
	DFARS 252.225-7010	Duty-Free Entry – Additional Provisions (AUG 2000) (Applicable

		when FAR 52.225-8 – Duty-Free Entry is included in the contract.)
	DFARS 252.225-7016	Restriction On Acquisition Of Ball And Roller Bearings (DEC 2000) (Applicable if contract includes deliverable supplies, unless Contracting Officer knows that items being acquired do not contain ball or roller bearings)
X	DFARS 252.225-7026	Reporting of Contract Performance Outside the United States (JUN 2000) (Applicable only when contract value exceeds \$500,000 or when any modification increases contract value to more than \$500,000)
	DFARS 252.226-7001	Utilization of Indian Organizations and Indian-Owned Economic Enterprises (SEP 2001) [(Applicable if FAR Part 12 not used, and for supplies and services expected to exceed SAP thresholds) (This Interim Rule replaces FAR 52.226-1 (JUN 2000) via DFARS Chg Ntc 200110911)]
	DFARS 252.227-7018	Rights in Noncommercial Technical Data and Computer Software – Small Business Innovation Research (SBIR) Program (JUN 1995) (Applicable when technical data or computer software will be generated during performance of contracts under the SBIR Program)
X	DFARS 252.242-7004	Material Management and Accounting System (DEC 2000) (Applicable to contract actions exceeding \$100,000) (Not applicable to contracts set aside for exclusive participation by small business and small disadvantaged business concerns)

C. COST SHARING – NO FEE RESEARCH AND DEVELOPMENT CLAUSES

The following FAR and DFARS clauses apply to Cost Sharing – No Fee Research and Development Contracts and are either required by regulation or are required when the circumstances of the contract warrant that they apply. The FAR and DFARS clauses for Cost-Sharing Research and Development Contracts only apply when specifically marked with an (X):

	FAR 52.216-11	Cost Contract -- No Fee (APR 1984) and Alternate I (APR 1984) Replace 52.216-8) [This clause may be modified by substituting "\$10,000" in lieu of "\$100,000" as the maximum reserve in paragraph (b) if the Contractor is a nonprofit organization.]
X	FAR 52.216-12	Cost Sharing Contract -- No Fee (APR 1984)
	FAR 52.227-10	Filing of Patent Applications –Classified Subject Matter (APR 1984) (Applicable if contract is subject to FAR clause 52.204-02 and either 52.227-11 or 52.227-12)
	FAR 52.227-11	Patent Rights – Retention by the Contractor (Short Form) (JUN 1997) (Applicable if contractor is a small business or non profit organization)
	OR	
X	FAR 52.227-12	Patent Rights – Retention by the Contractor (Long Form) (JAN 1997) (Applicable if contractor is a large business)
X	FAR 52.246-9	Inspection of Research and Development (Short Form) (Apr 1984)
	FAR 52.247-63	Preference for U.S.-Flag Air Carriers (JAN 1997)
	DFARS 252.227-7034	Patents – Subcontracts (APR 1984) (Applicable when FAR 52.227-11 applies)
	DFARS 252.227-7039	Patents – Reporting of Subject Inventions (APR 1990) (Applicable when FAR 52.227-11 applies)
X	DFARS 252.235-7011	Final Scientific Or Technical Report (Sep 1999)

SECTION J - LIST OF ATTACHMENTS

- 1) Attachment Number 1 entitled, "Statement of Work," 8 pages.
- 2) Attachment Number 2 entitled, "Deliverables," 1 page.
- 3) EXHIBIT A entitled, "Contract Data Requirements List," (DD Form 1423), 1 page.
- 4) Enclosure Number 1 entitled, "Contract Data Requirements List - Instructions for Distribution," 3 pages.
- 5) Attachment Number 3 entitled, "Master Small Business Subcontracting Plan," and "Contract Specific Subcontracting Plan" 14 pages.
- 6) Attachment Number 4 entitled, "Financial Accounting Data Sheet," 1 page.

SECTION K - REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF OFFEROR

- 1) The Contractor's Representations and Certifications, dated 03 April 2002, are hereby incorporated into this contract by reference.

Attachment Number 1: Statement of Work

Base Period

Task Area: Crystal Growth

Task 1: Develop high quality seeds for 3-inch diameter crystals

Cree will develop ultra-low MPD 4H-SiC seeds to support the 3 inch wafer micropipe reduction goals of task 3 and of Cree's DARPA Power program (01-35-51). This will be accomplished by the following subtasks:

Task 1.1 Control stoichiometry.

Task 1.2 Stabilize the thermal field.

Task 1.3 Stabilize the growth flux.

Task 1.4 Investigate novel seed surface preparation techniques.

Task 2: Develop high quality seeds for 4-inch diameter crystals

Cree will develop ultra-low MPD 4H-SiC seeds to support the 4 inch wafer micropipe reduction goals of task 3 and of Cree's DARPA Power program (01-35-51). This will be accomplished by the following subtasks to:

Task 2.1 Reduce thermal stresses by an order of magnitude by applying advanced thermal modeling to reduce thermal gradients and applying flux enhancing modes to maintain growth rate in seed growth process.

Task 2.2 Improve seed mechanical parameters.

Task 3: Develop low-defect 4-inch diameter HPSI 4H-SiC substrates

The development of low MPD ($< 40 \text{ cm}^{-2}$) 4-inch diameter HPSI 4H-SiC substrates will be accomplished as follows:

Task 3.1 Develop advanced automated process for accurate micropipe counting in semi-insulating substrates.

Task 3.2 Apply advanced thermal and mass transfer modeling to suppress micropipe generation without sacrificing deep-level concentrations.

Task 3.3 Apply advanced growth methods to reduce micropipes in HPSI crystals.

Task 4: Reduce shallow impurities in undoped 4H-SiC by one-hundred fold to enhance semi-insulating behavior.

To achieve highly uniform reproducible semi-insulating behavior in 4-inch diameter 4H-SiC, Cree will work to attain a one-hundred fold reduction in background shallow impurity concentrations in undoped crystals. This task will be comprised of the following subtasks:

Task 4.1 Reduce background shallow donor concentrations by applying innovative reduction techniques.

Task 4.2 Reduce background shallow acceptor concentrations by applying innovative reduction techniques.

Task 4.3 Use novel techniques to achieve ultra-tight compensation of residual shallow level impurities, thereby enhancing the effect of intrinsic deep-levels to achieving uniform semi-insulating behavior

over the full 4-inch substrate diameter.

Task 5: Enhance the concentration of intrinsic deep-levels in 4H-SiC by active control of C/Si stoichiometry.

Cree will develop a HPSI growth process comprising manipulation of the concentration of intrinsic deep-levels to achieve highly controlled semi-insulating behavior. This task will rely on the following subtasks:

Task 5.1 Manipulate intrinsic deep-level concentrations by applying novel techniques for point defect equilibrium control.

Task 5.2 Construct and demonstrate an advanced sublimation growth system comprising the ability to actively influence stoichiometric conditions at the crystal growth interface by the introduction of Si and carbon-bearing molecular species during growth.

Task Area: Epi Development

Task 6: Develop 5% uniformity 4-inch SiC epitaxial growth capability

Task 6.1 Convert SiC planetary reactor from a multi 2 inch to multi 3 inch-inch configuration and develop the latter SiC epitaxial growth capability with 3% uniformity.

Task 6.2 Develop process for 4-inch epitaxial growth capability with 5% uniformity.

Task Area: Material-Device Correlation

Task 7: Provide material-device correlation studies by fabricating and characterizing SiC MESFETs

Task 7.1 Fabricate wafer lots of MESFETs containing a dense array of PCM test structures and unit-cell MESFETs to support the crystal growth and epi development tasks.

Task 7.2 Characterize all wafers with DC, S-Parameter and RF load-pull testing.

Table 1: Task Goals for SiC Material Effort

Task(s) Goal	12-18 months
3-5	3-inch SI (90% $>10^6 \Omega\text{cm}$) and MPD $< 40 \text{ cm}^{-2}$ 4-inch SI (90% $>10^6 \Omega\text{cm}$) and MPD $< 80 \text{ cm}^{-2}$
6	Demonstrate 3-inch with 3% uniformity, thickness and doping

Task 8. Growth Optimization of Baseline AlGaIn/GaN HEMT

Growth conditions will be optimized in the novel Modified platform with special attention to the three most important layers of the AlGaIn-GaN HEMT, namely the nucleation layer, GaN layer and the AlGaIn barrier layer 3" growth will be investigated in the second half of Year 1. A 4" configuration will be analyzed towards the end of the program. Throughout all of the optimization of materials properties for device performance, extensive use of DOE (design of experiments) methodology will be

used. At the end of 12 months, the reactor will be evaluated for hardware modification based on the results to date.

The 12-month goals are:

- 3" GaN HEMT Epi with better than 3% uniformity in sheet resistivity (thickness and doping).
- 3" GaN HEMT Epi with mobility > 1000 cm²/V-s and 3% uniformity

Task 9. Substrate interaction with epitaxy and devices

Substrate properties can influence the quality of epitaxy, device yield and performance. For the most direct comparisons, wafers will be grown upon in the same epi run. These wafers will then be processed in the same device run. This will minimize the relative influence of the epi and process so that the effects of different substrates can be discerned. Wafer maps of device yield will be correlated with maps of epi and substrates.

The 12-month goals are:

- Quantify effect of substrates

Task 10. AlN barrier HEMTs

This task will concentrate on the optimization of the growth parameters of the thin AlN layer and the AlGa_N/AlN/GaN barrier layer above it. Growth optimization of the AlGa_N/AlN/GaN HEMT structure will be addressed by investigating the effects of AlN barrier thickness and related growth parameters and the effect of AlGa_N barrier composition and thickness in the AlN barrier HEMT. The goal of this task is to demonstrate high sheet charge epilayer structures without sacrificing mobility, resulting in low sheet resistance.

The 12-month goals are:

- Sheet resistances below 300 Ω/□ with 3% uniformity will be targeted.
- Scale down the total barrier thickness below 200 Å, while still maintaining > 1x10¹³/cm² sheet charge density

In addition to the AlGa_N/AlN/GaN barrier structure, the AlN layer also enables the growth of high mobility AlGa_N/AlN/InGa_N and AlGa_N/AlN/GaN/InGa_N epi structures. These structures potentially will combine the advantages of the AlN approach with the growth of InGa_N channels offering improved strain characteristics and mm-wave performance. For the InGa_N growth, effect of variation of indium composition and the thickness of the InGa_N channel on the above HEMT epi structures will be investigated. Uniformity targets for sheet resistance are better than 5% on a 2" wafer in year 1. Mobilities of > 700 cm²/V-s with a sheet charge of > 1x10¹³/cm² will be targeted.

Task 11. Reduced dislocation density

GaN has high dislocation densities when grown on highly mismatched substrates. The goal of this task is to reduce the dislocation density to < 10⁸ cm⁻².

The goal of this task is to make III-nitride material of sufficient quality to determine whether improvements are evident in the characteristics of simple devices.

The 12-month goals are: $< 3 \times 10^8/\text{cm}^2$ dislocation density for 3" GaN HEMT Epi.

Task 12. Device fabrication for material-device correlation in support of tasks 8-11

Device fabrication for performing material-device correlation shall be done for each of the epitaxial tasks. Approximately 1.5 wafer lots will be fabricated each month. In addition, approximately 1 wafer/month shall also be fabricated using electron-beam lithography for gate definition to aid in the material-device correlation for epitaxial growths targeting mm-wave devices.

Measurements for detailed material-device correlation will be done

		Milestones
Task	Activity	12 Months
8	HEMT Epi: Modified Platform	<ul style="list-style-type: none"> • 3" GaN sheet resistivity and Al composition uniformity $< \pm 3\%$, • Mobility $> 1000 \text{ cm}^2/\text{V-s}$
9	Substrate Correlation	<ul style="list-style-type: none"> • Quantify effect of substrates
10	AlN Barrier HEMTs	<ul style="list-style-type: none"> • AlN HEMTs: Very low sheet resistivity ($< 300 \text{ ohms/sq}$) with high uniformity. • AlN/InGaN HEMTs: $\mu > 700$, $n_s > 1 \times 10^{13}$.
11	Dislocation Reduction	<ul style="list-style-type: none"> • $< 3 \times 10^8 \text{ cm}^{-2}$ dislocations

Table 2. Summary of Tasks & associated milestones for GaN Epi

Option Period

The optional tasks stated below represent a continuation of the base program required to meet the specified goals of the option period. As such, the task descriptions are broadly stated similar to the base program. However, the established goals under the option period are higher than the goals of the base period because the contractor is anticipated to enhance the accomplishments of the base program to obtain the desired increases in resistivity/uniformity/mobility for the 3" SiC and GaN materials technologies. The optional tasks will also complete the work required to address the 4" goals of the program.

Task Area: Crystal Growth

Task 1: Develop high quality seeds for 3-inch diameter crystals

Cree will develop ultra-low MPD 4H-SiC seeds to support the 3 inch wafer micropipe reduction goals of task 3 and of Cree's DARPA Power program (01-35-51). This will be accomplished by the following subtasks:

Task 1.1 Control stoichiometry.

Task 1.2 Stabilize the thermal field.

Task 1.3 Stabilize the growth flux.

Task 1.4 Investigate novel seed surface preparation techniques.

Task 2: Develop high quality seeds for 4-inch diameter crystals

Cree will develop ultra-low MPD 4H-SiC seeds to support the 4 inch wafer micropipe reduction goals of task 3 and of Cree's DARPA Power program (01-35-51). This will be accomplished by the following subtasks to:

Task 2.1 Reduce thermal stresses by an order of magnitude by applying advanced thermal modeling to reduce thermal gradients and applying flux enhancing modes to maintain growth rate in seed growth process.

Task 2.2 Improve seed mechanical parameters.

Task 3: Develop low-defect 4-inch diameter HPSI 4H-SiC substrates

The development of low MPD ($< 40 \text{ cm}^{-2}$) 4-inch diameter HPSI 4H-SiC substrates will be accomplished as follows:

Task 3.1 Develop advanced automated process for accurate micropipe counting in semi-insulating substrates.

Task 3.2 Apply advanced thermal and mass transfer modeling to suppress micropipe generation without sacrificing deep-level concentrations.

Task 3.3 Apply advanced growth methods to reduce micropipes in HPSI crystals.

Task 4: Reduce shallow impurities in undoped 4H-SiC by one-hundred fold to enhance semi-insulating behavior.

To achieve highly uniform reproducible semi-insulating behavior in 4-inch diameter 4H-SiC, Cree will work to attain a one-hundred fold reduction in background shallow impurity concentrations in undoped crystals. This task will be comprised of the following subtasks:

Task 4.1 Reduce background shallow donor concentrations by applying innovative reduction techniques.

Task 4.2 Reduce background shallow acceptor concentrations by applying innovative reduction techniques.

Task 4.3 Use novel techniques to achieve ultra-tight compensation of residual shallow level impurities, thereby enhancing the effect of intrinsic deep-levels to achieving uniform semi-insulating behavior over the full 4-inch substrate diameter.

Task 5: Enhance the concentration of intrinsic deep-levels in 4H-SiC by active control of C/Si stoichiometry.

Cree will develop a HPSI growth process comprising manipulation of the concentration of intrinsic deep-levels to achieve highly controlled semi-insulating behavior. This task will rely on the following subtasks:

Task 5.1 Manipulate intrinsic deep-level concentrations by applying novel techniques for point defect equilibrium control.

Task 5.2 Construct and demonstrate an advanced sublimation growth system comprising the ability to actively influence stoichiometric conditions at the crystal growth interface by the introduction of Si and carbon-bearing molecular species during growth.

Task Area: Epi Development

Task 6: Develop 5% uniformity 4-inch SiC epitaxial growth capability

Task 6.1 Convert SiC planetary reactor from a multi 2 inch to multi 3 inch-inch configuration and develop the latter SiC epitaxial growth capability with 3% uniformity.

Task 6.2 Develop process for 4-inch epitaxial growth capability with 5% uniformity.

Task Area: Material-Device Correlation

Task 7: Provide material-device correlation studies by fabricating and characterizing SiC MESFETs

Task 7.1 Fabricate wafer lots of MESFETs containing a dense array of PCM test structures and unit-cell MESFETs to support the crystal growth and epi development tasks.

Task 7.2 Characterize all wafers with DC, S-Parameter and RF load-pull testing.

Table 1 (option period): Task Goals for SiC Material Effort

Task(s) Goal	6 Month Option
3-5	3-inch SI (90% $>10^7 \Omega\text{cm}$) and MPD $< 10 \text{ cm}^{-2}$ 4-inch SI (90% $>10^7 \Omega\text{cm}$) and MPD $< 40 \text{ cm}^{-2}$
6	Demonstrate 4-inch with 5% uniformity, thickness and doping

Task 8. Growth Optimization of Baseline AlGaIn/GaN HEMT

Growth conditions will be optimized in the novel Modified platform with special attention to the three most important layers of the AlGaIn-GaN HEMT, namely the nucleation layer, GaN layer and

the AlGa_N barrier layer 3" growth will be investigated in the second half of Year 1. A 4" configuration will be analyzed towards the end of the program. Throughout all of the optimization of materials properties for device performance, extensive use of DOE (design of experiments) methodology will be used. At the end of 12 months, the reactor will be evaluated for hardware modification based on the results to date.

The 24-month best-effort goals are:

- 4" Ga_N HEMT Epi with better than 1% uniformity in sheet resistivity (thickness and doping) over a 90% usable area
- 4" Ga_N HEMT Epi with mobility > 1500 cm²/V-s and 1% uniformity

Task 9. Substrate interaction with epitaxy and devices

Substrate properties can influence the quality of epitaxy, device yield and performance. For the most direct comparisons, wafers will be grown upon in the same epi run. These wafers will then be processed in the same device run. This will minimize the relative influence of the epi and process so that the effects of different substrates can be discerned. Wafer maps of device yield will be correlated with maps of epi and substrates.

Task 10. AlN barrier HEMTs

This task will concentrate on the optimization of the growth parameters of the thin AlN layer and the AlGa_N barrier layer above it. Growth optimization of the AlGa_N/AlN/Ga_N HEMT structure will be addressed by investigating the effects of AlN barrier thickness and related growth parameters and the effect of AlGa_N barrier composition and thickness in the AlN barrier HEMT. The goal of this task is to demonstrate high sheet charge epilayer structures without sacrificing mobility, resulting in low sheet resistance.

In addition to the AlGa_N/AlN/Ga_N barrier structure, the AlN layer also enables the growth of high mobility AlGa_N/AlN/InGa_N and AlGa_N/AlN/Ga_N/InGa_N epi structures. These structures potentially will combine the advantages of the AlN approach with the growth of InGa_N channels offering improved strain characteristics and mm-wave performance. For the InGa_N growth, effect of variation of indium composition and the thickness of the InGa_N channel on the above HEMT epi structures will be investigated. Uniformity targets for sheet resistance are better than 5% on a 2" wafer in year 1. Mobilities of > 700 cm²/V-s with a sheet charge of > 1x10¹³/cm² will be targeted.

Task 11. Reduced dislocation density

GaN has high dislocation densities when grown on highly mismatched substrates. The goal of this task is to reduce the dislocation density to < 10⁸cm⁻².

The goal of this task is to make III-nitride material of sufficient quality to determine whether improvements are evident in the characteristics of simple devices.

Task 12. Device fabrication for material-device correlation in support of tasks 8-11

Device fabrication for performing material-device correlation shall be done for each of the

epitaxial tasks. Approximately 1.5 wafer lots will be fabricated each month. In addition, approximately 1 wafer/month shall also be fabricated using electron-beam lithography for gate definition to aid in the material-device correlation for epitaxial growths targeting mm-wave devices.

Measurements for detailed material-device correlation will be done

The milestones targeted for the various tasks at 24 months are described in Table 2.

		Milestones
Task	Activity	24 Months
8	HEMT Epi: Modified Platform	<ul style="list-style-type: none"> • 3" sheet resistivity uniformity < +/- 1% • 4" AlGaIn-GaN HEMT Epi demonstration
9	Substrate Correlation	<ul style="list-style-type: none"> • Specify substrate requirements
10	AlN Barrier HEMTs	<ul style="list-style-type: none"> • Quantify improvement with AlN barrier HEMTs
11	Dislocation Reduction	<ul style="list-style-type: none"> • <1E8cm⁻² dislocations

Table 2. Summary of Tasks & associated milestones for GaN Epi

Attachment Number 2: Deliverables

	Type of Deliverable	Base Period						Option		Comment
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	
1	3", UHP, SI, SiC substrates	6	6	6	4	4	2	2	2	1,4
2	4", UHP, SI, SiC substrates				2	2	4	4	4	1,4
3	2", Processed, HPSI, MESFET wafers		4							
4	3", Processed, HPSI, MESFET wafers			4	4	6	6	6	6	
5	4", GaN HEMT Epi Wafers								2	1
6	2", GaN HEMT Epi Wafers	5	5	4	2	4	2			1,4
7	3", GaN HEMT Epi Wafers				1	1	2	5	4	1,4
8	Processed, 2", GaN HEMT wafers	3	3	3	3		3		3	
9	Processed, 3", GaN HEMT wafers						3		3	
10	2", GaN HEMT Epi Wafers			1						1,4
11	3", GaN HEMT Epi Wafers				2	1	2	1	2	1,4
12	Processed, 3", GaN HEMT wafers				3	6		6	6	
13	3" SiC MESFET Epi				4					5
14	4" SiC MESFET Epi								2	5
15	Data Sheets	X	X	X	X	X	X	X	X	2
16	Mask Set Design									3

The numbers under the column for each quarter represent the number of units to be delivered each quarter.

COMMENTS

1. Deliverables must demonstrate that the contract goals and/or milestones have been met.
2. The contractor shall deliver data summaries for all tests run on the deliverables and/or representative companion wafers and devices that were tested.
3. Mask set designs, excluding proprietary mask levels, shall be submitted to the government for review no later than one month after the effective date of the contract.
4. Attempt should be made to have epi wafers representative of those used for the processed HEMT wafers.
5. Attempt should be made to have epi wafers representative of those used for the processed MESFET wafers.

CONTRACT DATA REQUIREMENTS LIST										Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 440 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection or information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget Paperwork Reduction Project (0704-0188), Washington, DC 20503.											
A. CONTRACT LINE ITEM NO. 0003 (and Option CLIN 0006 if exercised)				B. EXHIBIT A		C. CATEGORY TOP <input type="checkbox"/> TM <input type="checkbox"/> OTHER <input checked="" type="checkbox"/>					
D. SYSTEM/ITEM Development of 4-inch Diameter 4H Silicon Carbide Semi-Insulating Substrates, Epitaxy						E. CONTRACT/PR NO. N00014-02-C-0306		F. CONTRACTOR CREE, INC.			
1. DATA ITEM NO. A001		2. TITLE OF DATA ITEM Monthly Status Reports*				3. SUBTITLE					
4. AUTHORITY (Data Acquisition Document No.)				5. CONTRACT REFERENCE Section H.1 of Schedule				6. REQUIRING OFFICE See Section F.4			
7. DD 250 REQ LT*		9. DST STATEMENT REQUIRED		10. FREQUENCY Monthly		12. DATE OF FIRST SUBMISSION 30 days after the effective date of the Contract				14. DISTRIBUTION ADDRESSEE	
8. APP CODE		11. AS OF DATE See Blk 12.		13. DATE OF SUBSEQUENT SUBMISSION Every 30 days thereafter				b. COPIES Draft <input type="checkbox"/> Final <input type="checkbox"/>		REQ <input type="checkbox"/> REPRO <input type="checkbox"/>	
16. REMARKS * These monthly reports shall contain the following: major accomplishments, issues, problems, monthly dollar expenditures on a comprehensive/cumulative basis as well as a comparison of projected versus actual expenditures, and plans for next month and next 3 months. The reports may be submitted electronically, may be approximately two pages in length, and can be in contractor format.						See Enclosure Number 1		15. TOTAL			
1. DATA ITEM NO. A002		2. TITLE OF DATA ITEM Presentation Materials*				3. SUBTITLE					
4. AUTHORITY (Data Acquisition Document No.)				5. CONTRACT REFERENCE Section H.1 of the Schedule				6. REQUIRING OFFICE See Section F.4			
7. DD 250 REQ LT*		9. DST STATEMENT REQUIRED		10. FREQUENCY As Required		12. DATE OF FIRST SUBMISSION *				14. DISTRIBUTION ADDRESSEE	
8. APP CODE		11. AS OF DATE *		13. DATE OF SUBSEQUENT SUBMISSION *				b. COPIES Draft <input type="checkbox"/> Final <input type="checkbox"/>		REQ <input type="checkbox"/> REPRO <input type="checkbox"/>	
16. REMARKS *The presentation materials will be on an as- required basis in a format to be requested by the Program Officer.						See Enclosure Number 1		15. TOTAL			
1. DATA ITEM NO. A003		2. TITLE OF DATA ITEM Final Report*				3. SUBTITLE					
4. AUTHORITY (Data Acquisition Document No.)				5. CONTRACT REFERENCE Section H.1 of the Schedule				6. REQUIRING OFFICE See Section F.4			
7. DD 250 REQ DD		9. DST STATEMENT REQUIRED		10. FREQUENCY ONE/R		12. DATE OF FIRST SUBMISSION See Section F				14. DISTRIBUTION ADDRESSEE	
8. APP CODE		11. AS OF DATE		13. DATE OF SUBSEQUENT SUBMISSION				b. COPIES Draft <input type="checkbox"/> Final <input type="checkbox"/>		REQ <input type="checkbox"/> REPRO <input type="checkbox"/>	
16. REMARKS * DD 250 required only for acceptance by the Program Officer designated in Section F.2. Information copies of this report shall be distributed in accordance with Enclosure Number 1.						See Enclosure Number 1		15. TOTAL			
1. DATA ITEM NO. A004		2. TITLE OF DATA ITEM Semi-Annual Progress Report*				3. SUBTITLE					
4. AUTHORITY (Data Acquisition Document No.)				5. CONTRACT REFERENCE Section H.1 of Schedule				6. REQUIRING OFFICE See Section F.4			
7. DD 250 REQ LT*		9. DST STATEMENT REQUIRED		10. FREQUENCY Semi-Annual		12. DATE OF FIRST SUBMISSION 6 Months after contract effective date				14. DISTRIBUTION ADDRESSEE	
8. APP CODE		11. AS OF DATE		13. DATE OF SUBSEQUENT SUBMISSION Every 6 months thereafter				b. COPIES Draft <input type="checkbox"/> Final <input type="checkbox"/>		REQ <input type="checkbox"/> REPRO <input type="checkbox"/>	
16. REMARKS * These semi-annual (i.e., every 6 months) reports shall contain a comprehensive/cumulative description of the major accomplishments to date. The reports can be in contractor format.						See Enclosure Number 1		15. TOTAL			
G. PREPARED BY Bona Tilahun / ONR 251				H. DATE 26-Jun-02		L. APPROVED BY ONR 251				J. DATE 26-Jun-02	

ENCLOSURE NUMBER 1
CONTRACT DATA REQUIREMENTS LIST
INSTRUCTIONS FOR DISTRIBUTION

DISTRIBUTION OF MONTHLY STATUS REPORTS, PRESENTATION MATERIALS, AND CONTRACT FUNDS STATUS REPORTS

The minimum distribution for monthly reports, presentation materials, and contract funds status reports is as follows:

ADDRESSEE	DODAAD CODE	NUMBER OF COPIES	
		UNCLASSIFIED/ UNLIMITED	UNCLASSIFIED/ LIMITED AND CLASSIFIED
Program Officer E-Mail: dietrih@onr.navy.mil	N00014	1	1
Administrative Contracting Officer*	S1103A	1	1

* Send only a copy of the transmittal letter to the Administrative Contracting Officer; do not send actual reports to the Administrative Contracting Officer.

SEMI-ANNUAL REPORTS

The minimum distribution of semi-annual reports is as follows:

ADDRESSEE	DODAAD CODE	NUMBER OF COPIES	
		UNCLASSIFIED / UNLIMITED	UNCLASSIFIED/ LIMITED AND CLASSIFIED
Program Officer E-Mail: dietrih@onr.navy.mil	N00014	3	3
Administrative Contracting Officer*	S1103A	1	1
Director, Naval Research Lab Attn: Code 5227 4555 Overlook Avenue, SW Washington, D.C. 20375-5320 E-mail: reports@library.nrl.navy.mil	N00173	1	1
Defense Technical Information Center 8725 John J. Kingman Road STE 0944 Ft. Belvoir, VA 22060-6218 E-mail: tr@dtic.mil	S47031	2	2
Dr. Edgar J. Martinez Defense Advanced Research Projects Agency Microsystems Technology Office 3701 Fairfax Drive Arlington, VA 22203	MDA972	1	1
Thomas Jenkins AFRL/SNDM 2241 Avionics Circle RM C2G69	F33615	1	1

Wright-Patterson AFB, OH 45433-7322			
Daniel Judy Army Research Laboratory 2800 Powder Mill Road AMSRL-SE-RE Adelphi, MD 20783-1197	DAAD17	1	1
Evan Glaser Naval Research Laboratory 4555 Overlook Avenue SW Code 6877 Washington, DC 20375-5347	N00173	1	1
Dr. John C. Zolper Defense Advanced Research Projects Agency Microsystems Technology Office 3701 Fairfax Drive Arlington, VA 22203	MDA972	1	1

* Send only a copy of the transmittal letter to the Administrative Contracting Officer; do not send actual reports to the Administrative Contracting Officer.

FINAL REPORT DISTRIBUTION

The minimum distribution of the final report submitted in connection with this contract is as follows:

ADDRESSEE	DODAAD CODE	NUMBER OF COPIES	
		UNCLASSIFIED / UNLIMITED	UNCLASSIFIED/ LIMITED AND CLASSIFIED
Program Officer E-Mail: dietrih@onr.navy.mil	N00014	5	5
Administrative Contracting Officer*	S1103A	1	1
Director, Naval Research Lab Attn: Code 5227 4555 Overlook Avenue, SW Washington, D.C. 20375-5320 E-mail: reports@library.nrl.navy.mil	N00173	1	1
Defense Technical Information Center 8725 John J. Kingman Road STE 0944 Ft. Belvoir, VA 22060-6218 E-mail: tr@dtic.mil	S47031	2	2
Dr. Edgar J. Martinez Defense Advanced Research Projects Agency Microsystems Technology Office 3701 Fairfax Drive Arlington, VA 22203	MDA972	1	1
Thomas Jenkins AFRL/SNDM 2241 Avionics Circle RM C2G69 Wright-Patterson AFB, OH 45433-7322	F33615	1	1
Robert Kemerley	F33615	1	1

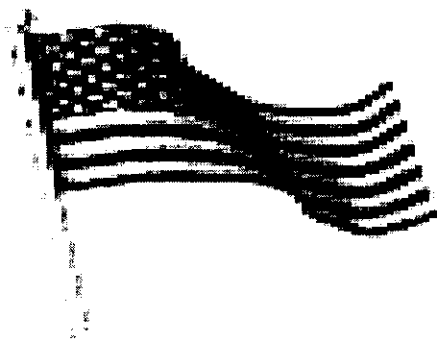
AFRL/SND 2241 Avionics Circle, Bldg 620 Wright-Patterson AFB, OH 45433-7322			
Daniel Judy Army Research Laboratory 2800 Powder Mill Road AMSRL-SE-RE Adelphi, MD 20783-1197	DAAD17	1	1
H. Bruce Wallace Army Research Laboratory 2800 Powder Mill Road AMSRL-SE-R Adelphi, MD 20783-1197	DAAD17	1	1
Dr. John C. Zolper Defense Advanced Research Projects Agency Microsystems Technology Office 3701 Fairfax Drive Arlington, VA 22203	MDA972	1	1
Gerald Borsuk Naval Research Laboratory 4555 Overlook Avenue Code 6800 Washington, DC 20375	N00173	1	1
C. J. (Skip) Scozzie US Army Research Laboratory AMSRL-SE-DP 2800 Powder Mill Road Adelphi, MD 20783-1197	DAAD17	1	1

* Send only a copy of the transmittal letter to the Administrative Contracting Officer; do not send actual reports to the Administrative Contracting Officer.

ELECTRONIC SUBMISSIONS OF TECHNICAL REPORTS IS PREFERRED AND ENCOURAGED. ELECTRONIC SUBMISSION SHOULD BE SENT TO THE E-MAIL ADDRESSES PROVIDED IN THE ABOVE TABLE, HOWEVER PLEASE NOTE THE FOLLOWING:

- Only Unlimited/Unclassified document copies may be submitted by e-mail.
- Unclassified/Limited has restricted distribution and a classified document (whether in its entirety or partially) is to be distributed in accordance with classified material handling procedures.
- Electronic submission to DIRECTOR, NAVAL RESEARCH LAB, shall be unclassified/unlimited reports and 30 pages or less. If unclassified and more than 30 pages, hardcopies of reports must be mailed.
- Electronic submission to DTIC shall be unclassified/unlimited reports. If submission is for limited documents, please send them in on a disk or sign up for DTIC's web-based document submission system at http://www.dtic.mil/dtic/submitting/elec_subm.html.

If the Program Officer directs, the Contractor shall make additional distribution of technical reports in accordance with a supplemental distribution list provided by the Program Officer.



CREE, INC.

**MASTER SMALL BUSINESS
SUBCONTRACTING PLAN**

**FOR THE DEPARTMENT OF DEFENSE CONTRACTS AND
MAJOR SUBCONTRACTS**

**Small Business Concerns/Veteran Owned Small Business Concerns and Service-
Disabled Veteran-Owned Small Business/Hubzone Small Business
Concerns/Small Business Concerns Owned and Controlled By Socially and
Economically Disadvantaged Individuals/Small Business Concerns Owned and
Controlled By Women**

**CREE, INC.
MASTER SMALL BUSINESS
SUBCONTRACTING PLAN**

Contractor: Cree, Inc. and its wholly-owned subsidiaries (Cree)

Address: 4600 Silicon Drive
Durham, NC 27703-8475

This is a Master Small Business Subcontracting Plan for Cree, Inc. and its wholly owned subsidiaries including, but not limited to, Cree Lighting Company and UltraRF, Inc. As used herein, "Cree" refers to the Cree company (Cree, Inc., Cree Lighting Company, UltraRF, Inc., or other subsidiary) that is a party to the contract in question. This Plan contains all the required elements of an individual contract plan except individual goals established for each Government contract or major subcontract. In addition, Cree shall submit a contract specific Plan to the contracting officer/buyer for final negotiation and approval. The contract specific plan will include goals based on the planned subcontracting for that contract.

STATEMENT OF POLICY:

It is the policy of Cree that small business concerns, veteran-owned small business concerns and service-disabled veteran-owned small business concerns, HUBZone small business concerns, small business concerns owned and controlled by socially and economically disadvantaged individuals, and small business concerns owned and controlled by women shall have the maximum practicable opportunity to participate in subcontracting at Cree. Cree hereby agrees to carry out this policy in awarding of subcontracts to the fullest extent, consistent with the efficient performance of Government contracts and subcontracts. Cree further agrees to cooperate in any studies or surveys as may be conducted by the Small Business Administration, or the awarding agency/department of the United States, as may be necessary to determine the extent of compliance with Federal Acquisition Regulation (FAR) 52.219-8 clause titled, "Utilization of Small Business Concerns (OCT 2000 Oct 1999)."

I. CONTRACT SPECIFIC GOALS

Cree shall submit proposed contract specific subcontracting goals for the term of each Government contract or major subcontract. The Contract Specific Plan submittal shall include goals for small business concerns (SB), veteran-owned small business concerns (VOSB) small business concerns owned and controlled by socially and economically disadvantaged individuals (SDB), HUBZone small business concerns (HUB), and small business concerns owned and controlled by women (WOSB). Service-disabled veteran-owned small business concerns meet the definition of veteran-owned small business concerns, and they will be included within the subcontracting plan goal for veteran-owned small business concerns. The negotiated and established goals of the Contract Specific Plan will be incorporated into this Master Plan by this reference, upon signature of the parties, and will not require contract modification.

The proposed goals shall be based upon an established percentage of estimated commercial purchases, which will be derived from the current fiscal year budget. Goals for the utilization of SB, VOSB, SDB, HUB, and WOSB subcontractors shall be expressed in both dollars and

CREE, INC.
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percentages for total planned dollars to be subcontracted; total dollars planned to be subcontracted to SB; total dollars planned to be subcontracted to VOSB, total dollars planned to be subcontracted to HUB; total dollars to be subcontracted to SDB; and total dollars planned to be subcontracted to WOSB concerns, unless otherwise required by the Contracting Officer/buyer.

Cree's subcontracting goals shall be set at a level that the parties reasonably expect can result from expending good faith efforts to use SB, VOSB, SDB, HUB, and WOSB subcontractors

2. DESCRIPTION OF SUPPLIERS AND SERVICES

The principal products and/or services to be subcontracted for the Contract Specific Plan, and the types of businesses supplying them shall be identified in an Attachment A to the Contract Specific Plan.

3. METHODOLOGY - GOALS

- a) The type of products/services typically needed by Cree is reviewed periodically to establish additional materials and services that are likely to be performed by a concern other than Cree.
- b) The Scope of Work for each Contract/subcontract is reviewed to establish potential material and services that could likely be performed by a concern other than Cree.
- c) From the total estimate of potential subcontracted items, a list of those items that are candidates for small businesses is established.
- d) From the total estimate of potential subcontracted items to small businesses, a list of those items that could be subcontracted to veteran-owned small business concerns is established
- e) From the total estimate of potential subcontracted items to small businesses, a list of those items that could be subcontracted to small disadvantaged business concerns is established.
- f) From the total estimate of potential subcontracted items, a list of those items that are candidates for HUBZone small business concerns is established.
- g) From the total estimate of potential subcontracted items to small business, a list of those items that could be subcontracted to women-owned small business concerns is established.

4. METHODOLOGY - POTENTIAL SOURCES

In the establishment of potential SB/VOSB/SDB/HUB/WOSB sources for solicitation purposes, the following resources are used:

**CREE, INC.
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- a) Cree Company Approved Supplier List;
- b) the Small Business Administration's (SBA) Pro-Net system, (<http://pro-net.sba.gov/>);
- c) the National Minority Business Council Vendor Information Service, (<http://www.nmbc.org/>);
- d) the Minority Business Development Administration's Phoenix database, (<http://www.mbda.gov/vendors.html>);
- e) the HUBZone data base in the Pro-Net system, (<http://pro-net.sba.gov/>);
- f) the 8(a) search database available through Pro-Net (<http://pro-net.sba.gov/>);
- g) the Woman-Owned Small business database available through Pro-Net (<http://pro-net.sba.gov/>);
- h) the Information Division of the Minority Business Development Agency in the Department of Commerce;
- i) the local Industrial Services Directory;
- j) other small and minority business associations; and
- k) Networking opportunities with the local Chamber of Commerce.
- l) Office of Veterans Business Development (<http://www.sba.gov/VETS/>)

5. INDIRECT COSTS

In accordance with FAR 52.219-9 (OCT 2000) Cree has decided not to include indirect costs in the goals specified for its individual contracts, however, for reporting purposes on the SF295 we will allocate a portion of indirect cost in accordance with the portion of DOD sales versus total company sales.

6. RESPONSIBILITIES FOR IMPLEMENTATION

This Master Subcontracting Plan and Contract Specific Plan there under, are to be administered by Cree to assure that the provisions of applicable Law and the plan are implemented and performed. Any change in the name of the administrator will be communicated without delay to the Contracting Officer/buyer by letter and will not require a contract modification.

The following individual will administer the subcontracting program:

Name: Carmen L. Hayes

Title: Contract Administrator/Small Business Utilization Specialist

Address: 4600 Silicon Drive
Durham, NC 27703

Telephone: (919)-313-5644

Email: carmen_hayes@cree.com

This individual's specific duties as they relate to this Subcontracting Program shall include, but are not limited to:

CREE, INC.
MASTER SMALL BUSINESS
SUBCONTRACTING PLAN

- a) Oversee compliance with the content of this Plan;
- b) Ensure that all Government subcontracts placed contain the latest provisions regarding small business and small disadvantaged business subcontracting and that the requirements of FAR 52.219-9 as implemented by this Plan are being fulfilled by Cree's large business subcontractors;
- c) Assure inclusion of SB, VOSB, SDB, HUB, WOSB concerns in all solicitations for products or services which they are capable of providing;
- d) Review solicitations to remove statements, clauses, etc. which may tend to restrict or prohibit SB, VOSB, SDB, HUB, WOSB participants;
- e) Participate in Business Opportunity Workshops, Minority Business Enterprise Seminars, Trade Fairs, etc., to assist SB, VOSB, SDB, HUB and WOSB concerns, and to discuss subcontracting opportunities with them. Plan to attend one DOD southeast council meeting per year;
- f) Perform periodic audit of sub-tier subcontracting plans to measure progress of goals and monitor attainment of goals under each Contract Specific Plan;
- g) Prepare and submit periodic subcontracting reports including SF 294/295, and cooperate in studies and surveys as required;
- h) Assist in developing and maintaining bidders list of SB, VOSB, SDB, HUB and WOSB concerns from all possible sources;
- i) Participate in procuring, planning and selection of potential sources to ensure that SB, VOSB, SDB, HUB and WOSB concerns are offered every opportunity to participate in the program; and,
- j) Coordinate and participate with the SBA small business utilization specialist, and other groups to locate capable firms.
- k) Facilitate the use of SB/ VOSB /SDB/HUB/WOSB by ensuring that adequate time is allowed for preparation of bids and that solicitation quantities, specifications, and delivery schedules facilitate the participation by such concerns.
- l) Counsel and discuss subcontracting opportunities with representatives of SB/ VOSB /SDB/HUB/WOSB firms.
- m) Provide notice to subcontractors concerning penalties and remedies for misrepresentations of business size status as SB/ VOSB B/SDB/HUB/WOSB for the purpose of obtaining a subcontract that is to be included as part or all of a goal.
- n) Coordinate and participate in annual program review.

**CREE, INC.
MASTER SMALL BUSINESS
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- o) Maintain vendor certification.

7. DESCRIPTION OF EFFORTS

In the establishment of the SB, VOSB, SDB, HUB and WOSB goals, the following resources are used: the Company Approved Supplier List; the Small Business Administration's Pro-Net system, (<http://pro-net.sba.gov/>); the National Minority Purchasing Council Vendor Information Service; the Minority Business Development Administration's Phoenix database, (<http://www.mbda.gov/vendors.html>); the Research and Information Division of the Minority Business Development Agency in the Department of Commerce, and other small and minority business associations.

Outreach efforts include:

- a) Assignment by name of specific individuals to carry out the requirements of company policies and procedures;
- b) Provision of technical and management assistance to small business, small disadvantaged business concerns and women-owned business concerns to ensure complete understanding of requirements;
- c) Assuring that Cree will consider small business concerns in all "make-or-buy decisions" and maintain records of these processes;
- d) Institute a program to recognize purchasing personnel who excel in administering the Cree subcontracting program;
- e) Participation in local Small Business Opportunity Fairs;
- f) Institute a program that recognizes small business participation in the success of performing Government contracts and major subcontracts; and
- g) Where additional bidders are required, the following publications will be used to search for capable firms:
 - a. Minority Business Enterprise, published by the Defense Logistics Agency.
 - b. Diversity Information Resources, National Business Campaign, 1201 12th Ave. N, Minneapolis, MN 55411. (<http://www.tryusdir.com>)
 - c. The Regional Minority Purchasing Council's listings.
 - d. The Women-Owned Business directory.
 - e. National Minority Council mailing list.

CREE, INC.
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- f. An outreach effort will be made to solicit the assistance of local, state, and federal officers, trade and manufacturing associations, and labor organizations in identifying qualified firms.

8. COMPLIANCE WITH FEDERAL ACQUISITION REGULATIONS (FAR)

Cree will include the FAR clause 52.219-8, titled "Utilization of Small Business Concerns, (OCT 2000)," in all subcontracts supporting Government contracts that offer further subcontracting opportunities, except contracts for personal services or subcontracts to be performed outside any territory or possession of the United States. Cree will require all subcontractors (except small business concerns) who support Government contracts and who receive subcontracts of \$500,000 or in the case of a subcontract for the construction of any public facility, \$1,000,000, and which offer further subcontracting possibilities to adopt and submit a plan similar to the Cree Plan, and one that complies with the requirements of the stated FAR clause.

9. REPORTING

Cree gives assurance of:

- a) Cooperation in any studies or surveys that may be required by the contracting agency, or the SBA.
- b) Submission of periodic reports that show compliance with the subcontracting plan. Cree may utilize the GSA "Formfill" web site <http://fillform.gsa.gov/> to complete and submit required reports.
- c) Submission of Standard Form (SF) 294, "Subcontracting Report for Individual Contracts," and SF-295, "Summary Subcontract Report," in accordance with the instructions on the forms.
- d) Ensuring that large business subcontractors with subcontracting plans agree to submit Standard Forms 294 and 295.

<u>Reporting Period</u>	<u>Report Due</u>	<u>Due Date</u>
Oct 1 - Mar 31	SF 294	April 30
Apr 1 - Sep 30	SF 294	October 30
Oct 1 - Mar 31	SF 295	April 30 (DoD only)
Oct 1 - Sep 30	SF 295	October 30
Subcontract Closeout	SF 294	Subcontract Completion

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10. RECORDS

Cree agrees to maintain at least the following types of records to document compliance with this Subcontracting Plan:

- a) Source lists, guides and other data identifying SB, VOSB, SDB, HUB and WOSB concerns;
- b) Organizations contacted in an attempt to locate sources that are SB, VOSB, SDB, HUB and WOSB concerns;
- c) On a subcontract-by-subcontract basis, records on all subcontract solicitations over \$100,000, indicating on each solicitation whether any SB, VOSB, SDB, HUB and WOSB concerns were solicited, and if not, why not;
- d) On a subcontract-by-subcontract basis, records indicating the reason an award was not made to a SB, VOSB, SDB, HUB and WOSB concern;
- e) Records to support other outreach efforts: contacts with minority and small business trade associations, contacts with business development organizations, attendance at small and minority business procurement conferences and trade fairs to locate SB, VOSB, SDB, HUB and WOSB concerns;
- f) Records to support internal activities to guide and encourage buyers through workshops, seminars, training programs and monitoring performance activities to evaluate compliance; and
- g) Records to support award data, including the name, address, and business size of each subcontractor.

**CREE, INC.
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- c) On a subcontract-by-subcontract basis, records on all subcontract solicitations over \$100,000, indicating on each solicitation whether any SB, VOSB, SDB, HUB and WOSB concerns were solicited, and if not, why not;
- d) On a subcontract-by-subcontract basis, records indicating the reason an award was not made to a SB, VOSB, SDB, HUB and WOSB concern;
- e) Records to support other outreach efforts: contacts with minority and small business trade associations, contacts with business development organizations, attendance at small and minority business procurement conferences and trade fairs to locate SB, VOSB, SDB, HUB and WOSB concerns;
- f) Records to support internal activities to guide and encourage buyers through workshops, seminars, training programs and monitoring performance activities to evaluate compliance; and
- g) Records to support award data, including the name, address, and business size of each subcontractor.

Cree hereby submits a request for approval of this Master Subcontracting Plan. This Plan shall be effective for three years after approval, or for the life of any contract/major subcontract that incorporates this Master Subcontracting Plan.

PLAN SUBMITTED BY:

(b) (6)
NAME: Cynthia Merrell
Chief Financial Officer

Date: 12/8/00

PLAN CONCURRED BY:

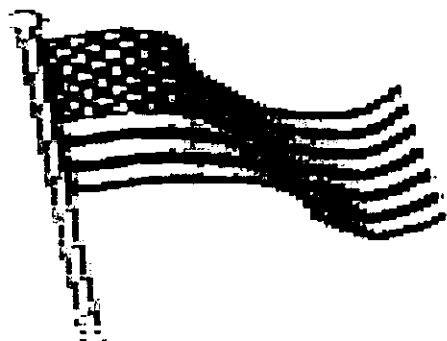
(b) (6)
Small Business Utilization Specialist

Date: 11/21/00

PLAN ACCEPTED BY:

(b) (6)
Contracting Officer

Date: 1/8/01



CREE, INC.

***CONTRACT/MAJOR SUBCONTRACT
SPECIFIC***

***SB/HUB/SDB/WOB/VOSB
SUBCONTRACTING PLAN***

CREE, INC.
SB/HUB/SDB/WOB
SUBCONTRACTING PLAN
FOR
CONTRACT/SUBCONTRACT NO:
DARPA BAA 01-35

Contractor: Cree, Inc. (Cree)

Address: 4600 Silicon Drive
Durham, NC 27703

Product:

Contract Value: \$ __11,701,544__

1. GOALS-PERCENTAGE

This Contract Specific Plan relates specifically to the scope of work to be performed under this contract/major subcontract, including support services. Subcontracting opportunities have been found to exist in the scope of work as noted below. Further, Cree will continue to expand subcontracting opportunities for small business concerns, HUBZone small business concerns, small business concerns owned and controlled by socially and economically disadvantaged individuals, and small business concerns owned and controlled by women, as they become known to Cree.

This Contract Specific Plan, hereby incorporated into the Cree Master Subcontracting Plan are the following goals:

<i>Small Business (SB)</i>	__35__ %
<i>HUBZone Business</i>	__0__ %
<i>Small Disadvantaged Business (SDB)</i>	__0__ %
<i>Woman-Owned Small Business (WOSB)</i>	__34__ %
<i>Veteran-Owned Small Business (VOSB)</i>	__0__ %

2. GOALS-DOLLAR

Total dollars planned to be subcontracted is \$ 376,808.00 Total dollars planned to be subcontracted to small business concerns is \$ 130,906.00 Total dollars planned to be subcontracted to HUBZone's is \$ 0. Total dollars planned to be subcontracted to small disadvantaged business concerns is \$ 0. Total dollars planned to be subcontracted to woman-owned small business is \$ 128,444.00 Total dollars planned to be subcontracted to veteran-owned small business is \$ 0.

CREE, INC.
SB/HUB/SDB/WOB
SUBCONTRACTING PLAN

3. DESCRIPTION OF SUBCONTRACTING OPPORTUNITIES

The principal products and/or services to be subcontracted and the types of businesses to be utilized are included in Attachment 1.

**CREE, INC.
SB/HUB/SDB/WOB
SUBCONTRACTING PLAN**

for
CONTRACT/SUBCONTRACT NO.:
DARPA BAA 01-35

Approved:

(b) (6)
Small Business Utilization
Specialist, Cree, Inc

5-21-2002
Date

Contracting Officer/Buyer

Date

Item No.	Product	Quantity	\$ Amount	Total	Vendor	Business Type
1	GDMS	91.00	250.00	22,750.00	Shiva	Small
2	SIMS	212.00	375.00	79,500.00	Charles Evans	Small
3	Liquid Helium	90.00	208.80	18,792.00	Boc Gases	Large
4	Wafer/Cree				Cree	Large
5	Subsceptor w plugs	8.00	780.00	6,240.00	Carbone of America	Large
5a	Cover Plate Ring	38.00	127.00	4,826.00	Carbone of America	Large
5b	7 pc Segmented Cover Plate	18.00	780.00	14,040.00	Carbone of America	Large
5c	Disk 131 mm	48.00	210.00	10,080.00	Carbone of America	Large
5d	3" Satellite	47.00	27.00	1,269.00	Carbone of America	Large
5e	Pulldown Plate	12.00	152.50	1,830.00	Carbone of America	Large
5f	Support plate	13.00	90.00	1,170.00	Carbone of America	Large
6	TAC Coat Graphite Septor	9.00	2,117.00	19,053.00	Advanced Ceramics	Small
6a	TAC Coat Graphite plug	65.00	40.00	2,600.00	Advanced Ceramics	Small
6b	TAC Coat Graphite Satellite	22.00	190.95	4,200.90	Advanced Ceramics	Small
6b	TAC Coat Graphite Support Plt	3.00	278.30	834.90	Advanced Ceramics	Small
7	Discs-342mm	9.00	218.60	1,967.40	Calcarb, LTD	Small
8	Probe	26.00	585.00	15,210.00	Cascade Microtech	Large
9	Gold	77.00	426.82	32,865.14	Metal-approx	Large
10	Mask	17.00	630.00	10,710.00	Phototronics	Large
10a	Data Conversion	17.00	25.00	425.00	Phototronics	Large
12	NUNN Cleanroom		100.00	-	UCSB	Non Profit
12a	NUNN E-beam		342.00	-	UCSB	Non Profit
13	Masksels		698.00	-	Dupont	Large
14	Travel			128,444.00	Gale Gentry	WOSB

FINANCIAL ACCOUNTING DATA SHEET - NAVY

1. CONTRACT NUMBER (CRITICAL) N0001402C0306		2. SPIN (CRITICAL)		3. MOD (CRITICAL)		4. PR NUMBER 02PRI0579-00		PAGE 1 OF 1						
CLIN/SLN	6. LINE OF ACCOUNTING						7. AMOUNT (CRITICAL)	NAVY INTERNAL USE ONLY REF DOC/ACRN						
	A. ACRN (CRITICAL)	B. APPROPRIATION (CRITICAL)	C. SUBHEAD (CRITICAL)	D. OBJ CLA	E. PARM	F. RRM			G. SA	H. AAA (CRITICAL)	I. IT	J. PAA	K. COST CODE PROJ UNIT MOC PDU & SUE	
AA	9720400	1304	255	RA	313	0	068342	2D	000000	R2Y10	000	N132	\$5,036,261.00	PR#02PRI0579-00 FRC: A124
<div style="display: flex; justify-content: space-between;"> <div> <p>PAGE TOTAL \$5,036,261.00</p> <p>GRAND TOTAL \$5,036,261.00</p> </div> <div> <p>PREPARED/AUTHORIZED BY: _____</p> <p>DATE: _____</p> </div> <div> <p>COMPTROLLER APPROVAL: FOR FISCAL DATA AND S (b) (6)</p> <p>DATE: _____</p> <p>for COMPTROLLER, ONR CONTRACT REVIEWED</p> </div> </div>														

Contract Distribution Sheet

PR Number: 02PR10579-00
Contract Number: N00014-02-C-0306-
Specialist: BT ONR: 251

Distribution Date:

7-1-2002

Distributed By:

(b) (6)

— PCO, ONR Arlington (Original)

— Contractor (Duplicate Original)
Short Contractor Code and Address:
CREE
CREE INC
4600 SILICON DRIVE
DURHAM, NC 27703

— ACO
ACO MILSCAP Code & Address S1103A:
DCM ATLANTA
805 WALKER STREET SUITE 1
MARIETTA, GA 30060-2789

— Payment Office
DODAAD Code and Address HQ0338:
DFAS COLUMBUS CENTER DFAS CO SOUTH ENTITLEMENT OPERATIONS
PO BOX 182264
COLUMBUS, OH 43218-2264

— ONR:
00CC11
Program Officer: Harry Dietrich, ONR 312

— DCAA